

**Plastic object for use in personal hygiene**

The invention relates to a plastic object for use in personal hygiene, in accordance with the generic part of Claim 1, as well as a procedure for manufacturing the plastic object.

For example, a toothbrush constitutes a plastic object of this type. Toothbrushes are mass-produced articles, and must, therefore, be able to be manufactured economically. Toothbrushes made of a single plastic material, and toothbrushes consisting of two plastic components, which are manufactured in the two-component injection molding method, are known. In the latter case, the toothbrush includes two plastic parts: A first plastic part made out of a first plastic material, e.g., polypropylene, extends from the handle of the toothbrush to the head of the brush, and has interconnected recesses. A second plastic part made out of a second plastic material, e.g., thermoplastic elastomer, fills in the recesses of the first plastic part. These two plastic materials come into contact with each other at the contact surface, of the two plastic parts. Compared to a toothbrush made of only one plastic material, this results in greater opportunities for shaping. However, since the two plastic materials must combine with each other, during the injection molding process, one is restricted in the choice of plastic materials, and therefore, in the design of the toothbrush.

This difficulty also relates to other plastic objects, for use in personal hygiene, which are made of at least two parts...

made out of different plastic materials, such as containers, or closing caps for containers, that are intended for personal hygiene preparations and substances, or, also, for medical or dental preparations. One is also limited in the choice of plastic materials for the two parts, with regard to such plastic objects.

The basis, of the present invention, is the object of providing a plastic object, of the type initially named, with which various shapes are possible, under economical manufacturing conditions.

The invention solves this task through a plastic object, with the features of Claim 1. The procedure for manufacturing such a plastic object, according to the invention, is characterized by the features of Claim 10. Preferred further shapes, of the plastic object, of the invention, or of the procedure, in accordance with the invention, comprise the subject matter of the dependent claims.

As a result of the fact that the two parts of the plastic object are made up of at least two different molded parts, that do not combine with each other, during the injection molding process, and which are joined with each other, in particular, in a non-positive and/or a positive fit, there are many opportunities for shaping the plastic object, in accordance with its intended use. Plastic materials with various chemical properties can be used. They can differ, more or less greatly, in their structural formula, and in their chemical components. There must not be any chemical or physical bonds at all, at the contact surfaces between. . .

the plastic materials, for example, in the form of bridge bonds, or van der Waal's forces. The frictional forces between the molded parts, in the preferably shrink-on joint style connection, are sufficient, by themselves, to firmly combine the two molded parts with each other. The positive fit, by means of intermeshing parts, at the contact surfaces of the two molded parts, prevents gaps from forming between the two molded parts, during the shrinking process, into which water and impurities can penetrate, or which could even lead to a fracture.

For example, in the case of a toothbrush, plastics can be utilized, in the proper place, with advantageous properties. The one molded part, for example, can be made of polypropylene (polypropylene is economical, flexible, chemically resistant, but is not available in completely transparent appearance), while styrene-acrylonitrile (SAN) can be chosen for the other molded part (also economical, transparent, aesthetic). The molded part, bearing the brush head, can be manufactured of polypropylene to advantage, since polypropylene is resistant to the often corrosive substances of dentifrices.

Advantageously, the two plastic materials have different shrinkage properties, since such a firm shrink-on joint is easier to achieve. In this case, in a first step, the molded part, which is manufactured out of plastic, with the lower shrinkage, is extruded to advantage. In a second step, the second molded part made of plastic, with the greater shrinkage,

is extruded, resulting in a natural contact pressure, of the second plastic material, against the first one.

The invention is described in detail in the following, using the drawing.

- Fig. 1     a first example of a toothbrush consisting of two molded parts in side projection, and partially, in sectional elevation;
- Fig. 2     the toothbrush, as set forth in Fig. 1, in horizontal projection;
- Fig. 3     the toothbrush, as set forth in Fig. 1, in bottom view;
- Fig. 4     a first molded part of the toothbrush, as set forth in Fig. 1, in view, and partially in sectional elevation;
- Fig. 5     the molded part, as set forth in Fig. 4, in horizontal projection;
- Fig. 6     a second molded part of the toothbrush, as set forth in Fig. 1, in horizontal projection;
- Fig. 7     a section, as set forth in Line VII-VII in Fig. 6;
- Fig. 8     a join of the two molded parts, as set forth in Fig. 1, on an enlarged scale;
- Fig. 9     on an enlarged scale, a section, as set forth in Line IX-IX in Fig. 2;

Fig. 10 a second example of a toothbrush consisting of two molded parts in side projection;

Fig. 11 the toothbrush, as set forth in figure 10, in horizontal projection; and

Fig. 12 the toothbrush, as set forth in figure 10, on an enlarged scale, whereby a part for closing a handle hollow space, from the remaining toothbrush part, is shown separately.

According to Figures 1 through 3, a toothbrush 1 has a first molded part 2, which has, in its front area 2a, a brush head 3. The first molded part 2, made out of plastic material A, is encompassed by a second molded part 4, made out of plastic material B, over a section of its length, namely in its rear handle area 2b, and joined to it in a type of shrink-on joint. Plastic materials, A and B, are plastic materials that do not combine at the contact surfaces, during injection molding.

For the purpose of better illustration, the two molded parts 2, 4 are shown separately from each another in Figures 4 through 7. The two molded parts 2, 4 have - as will be described further below - diametrically opposed intermeshing projecting parts, and recesses, in their contact area, by means of which a positive fit, of the two molded parts 2, 4 is achieved, in addition to the non-positive fit. Of course, this fit . . .

does not occur until the injection molding process, in which, in a first step, one of the molded parts, and subsequently, in a second step, the other molded part is extruded around, or in it. With the differing shrinkage, of the two molded parts 2, 4, the molded part, made of plastic material that has the lower shrinkage, is extruded first to advantage. In the second step, the injection molding of the other molded part, made out of plastic material, with the greater shrinkage occurs, resulting in a natural contact pressure, of the second plastic material, against the first one.

The second molded part 4, shown separately in Figures 6 and 7, and, in essence, forming the toothbrush handle, is arranged in the form of a sleeve, i.e., provided with an interior longitudinal bore 7, which, in its form and diameter, matches the rear handle area 2b, of the first molded part 2, shown in Figures 4 and 5. The molded part 4 has an outer surface 6.

A front end surface 8 of the sleeve-shaped second molded part 4, is seen in the lengthwise direction of the toothbrush, assigned to a shoulder surface 9 of the first molded part 2 (Fig. 4). A ring-shaped front projecting part 10 of the second molded part 4, extends into a diametrically opposed recess 11, of the first molded part 2, which is particularly clear from Fig. 8. A rear end surface 14, of the sleeve-shaped second molded part 4, is assigned to a shoulder surface 16, of an end piece 15 of the first molded part 2. Here, also, a ring-shaped, rear projecting part 17, of the second molded part 4, extends into a diametrically opposed recess 18, of the end piece 15.

The second molded part 4 is equipped with an oblong diagonal bore 20, oval in cross-section, placed at a right angle to longitudinal bore 7, which is provided for a diametrically opposed, part 21 of the first molded part 2, that penetrates diagonal bore 20. Oval part 21 has an upper and a lower lateral face 22, 22'. The second molded part 4 has shoulder surfaces 23, 23' bordering on diagonal bore 20, that are diametrically opposed to lateral faces 22, 22'. In turn, lateral faces 22, 22' and shoulder surfaces 23, 23' form a type of projection/recess mold-locking connection, between the two molded parts 2, 4.

Together with outer surfaces 19, 19' (Fig. 4) of oval part 21, outer surface 6, of the sleeve-shaped molded part 4, forms a handle surface.

As far as material, for the two molded parts 2, 4, is concerned, polypropylene (PP) can be chosen to advantage for the first molded part 2, while the second molded part 4, for example, can, be made of the following plastic materials:

Styrene-acrylonitrile (SAN) and subgroups,  
Acrylonitrile-butadiene-styrene (ABS) and subgroups,  
Polyamide (PA) and subgroups,  
Polycarbonate (PC) and subgroups,  
Polyester (PBT) and subgroups, or other transparent plastic materials that do not combine with polypropylene (PP).

Each of the subgroups comprising the plastic materials, belong to the appropriate family.

This combination of materials results in a particular advantage. Since today's dentifrices frequently contain corrosive substances, such as peppermint oil, cheap plastic materials, such as SAN are often corroded. If the first molded part 2, which bears brush head 3, is made of PP, which is resistant to the corrosive materials, but not completely transparent, and the second molded part 4, containing the handle, is made out of SAN, which is transparent, but less resistant, the result of this special design mold, of the invention, is a toothbrush that can be economically manufactured, which is resistant to the corrosive substances of the dentifrice, and is also aesthetically pleasing. Naturally, any other resistant plastic material can be used in place of PP, and one of the above-named, cheaper, and, as a result, less resistant plastic materials can be used in place of SAN.

In this combination of materials, the second, sleeve-shaped molded part 4, preferably, is manufactured in a first step, by means of injection molding. Afterwards, in a second step, the first molded part 2 is extruded, whereby the already described positive fit, in the contact area of the two molded parts, 2, 4, takes place. As a result of the greater shrinkage, of the last extruded plastic material A (PP), of the first part 2, a natural contact pressure against the second part 4, made out of material B (for example SAN), takes place, and a non-positive and positive fit of both molded parts 2, 4, is brought about by the intermeshing of projecting parts 10, 17, 22, 22', into recesses 11, 18, 23, 23', without forming gaps between plastic materials A, B, that do not actually combine,



into which, water and impurities can penetrate, or which could even lead to a fracture.

As an example, a toothbrush 1, made of two molded parts 2, 4, is represented and described. A different design, of the two molded parts, would definitely be possible. The sleeve-shaped design, of one of the molded parts, is not absolutely necessary.

Of course, a toothbrush could also have several molded parts made of plastic materials, that do not combine during injection molding, which are joined by a non-positive and/or positive fit.

Instead of the described shrink and positive fit, the individual molded parts, with which there is no material contact, during injection molding, can be joined to each other by a non-positive and/or positive fit, in any other way.

However, molded parts, out of two or more plastic components, could also be joined to each other by a non-positive and/or positive fit, where, for example, one (or more) components, of the one molded part do not combine with one (or more) components of the other molded part.

In Fig. 10 and Fig. 11, a second example of a toothbrush 1' is shown, which also has two molded parts 32, 34 made out of different plastic materials A and B that do not combine with each other, during injection molding. Here, too, the . . .

first molded part 32 forms a toothbrush part, bearing brush head 3' (in Fig. 10, and Fig. 11 the bristles, of brush head 3', are not shown; only the cavities 35 provided for anchoring the bristle bunches can be seen). The second molded part 34 forms a toothbrush handle. This is furnished with a cylindrical groove 36, over a portion of its length, through which a hollow space 37, which is open in the rear, and can be locked, by means of a locking part 38, is formed in the toothbrush handle. The second molded part 34, preferably, consists of a material component, for example SAN, which is at least partially transparent, or translucent, so that, in hollow space 37, different artistic media can be visibly stored (loose objects, liquid, powder, printed rolls, etc.). Locking part 38 can be non-detachably, or detachably joined, with the second molded part 34. In the latter case, for example, hollow space 37 could also store practical items, such as toothpicks, or ampules containing mouthwash, or toothpaste.

Also, in this toothbrush design mold, the contact surfaces, of both molded parts 32, 34, are furnished with intermeshing parts 40, 41, so that the two plastic parts can be joined in a non-positive and positive fit during injection molding. The intermeshing parts 40, 41 are formed, for example, by a projecting part 40, at the front end of the molded part 34, forming the handle, and a diametrically opposed recess 41, at the front end of the other molded part 32.

If the handle is manufactured out of transparent SAN, then, also in this design mold, the handle forming molded part 34, preferably, will be manufactured first, in the injection molding process, and then molded part 32, bearing the brush head, will be extruded, for example, out of the more resistant polypropylene.

Both the bristle bearing part, of the toothbrush, and the handle can have parts made out of additional material components. For example, in molded part 34, a cavity can be provided for a thumb rest 42, from an additional material component, for example, made out of a thermoplastic elastomer (TPE).

The toothbrush, shown in Fig. 12, corresponds to toothbrush 1', from Fig. 10 and 11, but is represented, on an enlarged scale, and partially, in sectional area, compared to Fig. 10 (the same parts are marked with the same reference numerals). This toothbrush 1' is intended for the use of various filled ampules 30, for which a fixture 46, made of an elastic flexible plastic material, in the front area of recess 36, is present. Locking part 38 is furnished with an elastic flexible counter -fixture 36', in the interior. Ampule 30 is held both radially and axially in its position by the two fixtures 36, 38'. Fixture 36 can, for example, be made of the same plastic material (preferably out of PP), and be extruded in the same step, with molded part 32, bearing brush head 3' (the junction canal, for this purpose, is marked 47, in Fig. 12). A bore diagonal 48 in molded part 34, which is extruded first, can also be filled with the same plastic material, and in the same step . . .

(for example, made of SAN), whereby thumb rest 42 can be formed, on the exterior of the handle.

Ampules 30 can contain various decorative objects (loose or floating in liquid), liquid, powder, etc.

As already mentioned, similar to toothbrushes, other plastic objects, for use in personal hygiene, can be formed of at least two molded parts, which consist of different plastic materials that do not combine, during injection molding, and which are joined by a non-positive and/or positive fit. For example, plastics with advantageous properties can also be employed, in the right place, for economical production of containers, or closing caps for containers, that are intended for personal hygiene preparations and substances, or also for medical, or dental preparations.

**Patent Claims**

1. A plastic object for use in personal hygiene, consisting of at least two parts made of different plastic materials, characterized by the fact that the two parts, of the plastic object, are formed by at least two molded parts (2, 4; 32, 34), made out of different plastic materials, that do not combine with each other during the injection molding process, which are joined with each other, in particular, in a non-positive and/or a positive fit.
2. A plastic object, as set forth in Claim 1, characterized by the fact that the plastic object is a toothbrush (1; 1'), and that one molded part (2; 32) is a brush head (3) bearing toothbrush part, and the other molded part (4; 34) is a toothbrush part forming at least one part (6) of a handle.
3. A plastic object as set forth in Claim 1 or 2, characterized by the fact that to form a non-positive firm fit, between the two molded parts (2, 4; 32, 34), the one molded part (2; 32) is encompassed by the other molded part (4; 34), at least partially, in a kind of shrink-on joint.
4. A plastic object, as set forth in one of Claims 1 through 3, characterized by the fact that at least at one part of the contact surface, of both molded parts (2, 4; 32, 34), a positive fit is formed by intermeshing parts (10, 11; 16, 17; 22, 23; 22', 23'; 40, 41), of the two molded parts (2, 4; 32, 34).

5. A plastic object, as set forth in Claim 4, characterized by the fact, that the positive fit is formed by intermeshing projecting parts (10, 17, 22, 22', 40) on one molded part (4; 34 or 2; 32), and recesses (11, 18, 23, 23', 41) on the other molded part (2; 32 or 4; 34).
6. A plastic object, as set forth in one of Claims 1 through 5, characterized by the fact that the plastic materials (A, B) have differing shrinkage.
7. A plastic object as set forth in one of Claims 1 through 6, characterized by the fact that at least one of the two molded parts (2; 32 or 4; 34) is made of two or more plastic components, of which, at least one is not combinable with the plastic (A or B) of the other molded part (4; 34 or 2; 32).
8. A plastic object, as set forth in one of Claims 2 through 7, characterized by the fact that the one molded part (2; 32), which forms the brush head (3), is made of polypropylene, and the other molded part (4; 34) is made of styrene-acrylonitrile.
9. A plastic object, as set forth in one of Claims 2 through 7, characterized by the fact that the one molded part (2; 32), which forms the brush head (3), is made of polypropylene, and the other molded part (4; 34) is made of acrylonitrile-butadiene-styrene, or polyamide, or polycarbonate, or polyester.

10. Procedure for manufacturing a plastic object, as set forth in one of Claims 1 through 9, by means of injection molding, characterized by the fact that, in a first step, one of the molded parts (2; 32 or 4; 34) is extruded from a first plastic material (A or B), and then, in a second step, the other molded part (4; 34 or 2; 32) is extruded from a second plastic material (B or A), which does not combine with the first plastic material.
11. Procedure as set forth in Claim 10, characterized by the fact that in differing shrinkage of the two plastic materials (A, B), provided for the molded parts (2, 4; 32, 34) in the first step, the mold part (4; 34 or 2; 32) that is manufactured out of plastic, with the lower shrinkage (A or B), is extruded.
12. Procedure, as set forth in one of Claims 10 or 11, characterized by the fact that in the manufacturing of a toothbrush (1; 1'), in a first step, at least one part (6), of a molded part (4' 34), forming a toothbrush handle is extruded from styrene-acrylonitrile, and then, in a second step, the molded part (2; 32), bearing the brush head (3), is extruded from polypropylene.

**AMENDED CLAIMS**

[received at the International Bureau on May 03, 2000 (05/03/00);  
original Claims 1-12 replaced by new Claims 1-10 (3pages)]

1. Toothbrush encompassing a first molded part (2; 32) with a brush head (3), and a second molded part (4;34) forming at least a part of a handle, whereby the two molded parts (2, 4; 32, 34) are made of different plastic materials, characterized by the fact that the two molded parts (2, 4; 32, 34) are made of different plastic materials (A, B) that do not combine, with each other, during injection molding, and that to manufacture a non-positive firm fit, between the two molded parts (2, 4; 32, 34), the one molded part (2; 32) is at least partially encompassed by the other molded part (4; 34), in a kind of shrink-on joint.
2. Toothbrush as set forth in Claim 1, characterized by the fact that at least at one part of the contact surface of both molded parts (2, 4; 32, 34) a positive fit is formed by intermeshing parts (10, 11; 16, 17; 22, 23; 22', 23'; 40, 41) of the two molded parts (2, 4; 32, 34).
3. Toothbrush, as set forth in Claim 2, characterized by the fact, that the positive fit is formed by intermeshing projecting parts (10, 17, 22, 22', 40), on one molded part (4; 34 or 2; 32) and recesses (11, 18, 23, 23', 41), on the other molded part (2; 32 or 4; 34).



4. Toothbrush, as set forth in one of Claims 1 through 3, characterized by the fact that the plastic materials (A, B) have differing shrinkage.
5. Toothbrush, as set forth in one of Claims 1 through 4, characterized by the fact that at least one of the two molded parts (2; 32 or 4; 34) is made of two or more plastic components, of which at least one is not combinable with the plastic (A or B), of the other molded part (4; 34 or 2; 32).
6. Toothbrush, as set forth in one of Claims 1 through 5, characterized by the fact that the first molded part (2; 32), which forms the brush head (3), is made of polypropylene, and the other, second molded part (4; 34) is made of styrene-acrylonitrile.
7. Toothbrush, as set forth in one of Claims 1 through 5, characterized by the fact that the first molded part (2; 32) which forms the brush head (3), is made of polypropylene, and the other, second molded part (4; 34) is made of acrylonitrile-butadiene-styrene, or polyamide, or polycarbonate, or polyester.
8. Procedure for manufacturing a toothbrush, as set forth in one of Claims 1 through 7, by means of injection molding, characterized by the fact that, in a first step, one of the molded parts (2; 32 or 4; 34) is extruded from a first plastic material (A or B) and then, in a second step, the other molded part (4; 34 or 2; 32) is extruded from a second plastic material (B or A), which does not combine with the first plastic material, so . . .

that the one molded part (2; 32) is encompassed, at least partially, by the other molded part (4; 34) in a kind of shrink-on joint.

9. Procedure, as set forth in Claim 8, characterized by the fact that in differing shrinkage, of the two plastic materials (A, B), provided for the molded parts (2, 4; 32, 34) in the first step, the mold part (4; 34 or 2; 32), that is manufactured out of plastic, with the lower shrinkage (A or B), is extruded.
10. Procedure, as set forth in one of Claims 8 or 9, characterized by the fact that, in a first step, at least one part (6), of a molded part (4' 34), forming a toothbrush handle, is extruded from styrene-acrylonitrile, and then in a second step, the molded part (2; 32), bearing the brush head (3), is extruded from polypropylene.